

## II. CONGESTION EXTERNALITIES, TRANSMISSION TECHNOLOGY, AND PRICING SOLUTIONS

63. Everyone recalls the frustration of gas lines at service station pumps in the 1970s that resulted from federal price controls on gasoline following the oil embargoes. Price controls on access to the Internet over the PSTN create the equivalent of gas lines along the access roads to the information superhighway. Price controls fail to ration demand, fail to stimulate supply, and thus prevent markets from clearing. The inevitable result is rationing by congestion.

64. Congestion is an inefficient form of resource allocation because the resource is allocated by waiting time. The resource goes to those who value the service net of the opportunity cost of waiting for the service. Often that allocation rule means that those with the lowest opportunity cost of time receive the service rather than the highest-value user of the service itself. The FCC's discussion of packet-switched data networks versus circuit-switched voice calls focuses on the supply side of the market, but not the demand side, which is politically far more controversial. Economists are very familiar with political preferences for (and inefficiency of) rationing through queuing rather than through prices. However, as congestion worsens, it becomes apparent that price regulations are the root of the problem.

65. In part I we established the fundamental differences between voice demand and data demand for access services. We now consider the implications of access pricing for usage of the PSTN. Although data demand may currently be creating congestion externalities only in specific locations, the long-term trend is evident. Unless access pricing is reformed and the ESP exemption is ended, data traffic will create network congestion that will crowd out not only other data traffic, but also voice traffic.

66. Among the functions served by market prices are the provision of:

- incentives to consumers for efficient demand decisions
- incentives for efficient investment for suppliers
- incentives for efficient matching of buyers and sellers
- incentives for the market to select the best access option

There are many different technological ways to reduce the existing and potential congestion of the PSTN that comes from voice traffic and data traffic sharing the same network. The most desirable way to find that solution is not to depend on a regulatory choice of the "best" technology. Rather, the best way to proceed is to let access prices be set competitively, and to let market competition determine the best technology. Maintaining the ESP exemption will increase congestion and eliminate incentives for the market to select the best access option.

**A. Congestion Externalities from Data Transmission**

67. Together, the use of flat-rate pricing for local service and the exemption for ESPs have created congestion on the PSTN. The growth of Internet usage for commerce, entertainment, and other forms of communication will only worsen the congestion problem over time. Unless the ESP exemption from access charges is eliminated, the end result will be more congestion that will degrade service quality on the PSTN, with eventual crowding out of voice traffic and impediments to call completion.

68. The PSTN was engineered to handle traditional voice traffic. Even with flat-rate pricing of local service, the system did not become overloaded. As noted previously, the opportunity cost of time limited the length and frequency of calling. Moreover, usage of the local exchange for long-distance and wireless communication is limited because long-distance and wireless services are metered and customers are charged for their usage of those services.

69. The ISPs discerned an attractive loophole created by telecommunications pricing and regulation. By locating points of presence in the local exchange, ISPs could ensure that their services could be accessed by unmetered local calls. Next, the ISPs benefitted from the ESP exemption to avoid access charges, paying only for connection to the local exchange.

70. The ISPs were able to obtain a free ride on the local exchange, avoiding access charges paid by long-distance companies. In addition, many ISPs offer flat-rate pricing to their customers. Thus, customers of the ISPs can use the Internet at a zero marginal cost, taking advantage of the free ride on

LEC networks. Some ISP customers may even leave their lines connected for twenty-four hours a day, effectively converting their local service to private-line service without paying the associated costs.

71. The total demand for transmission is the sum of traditional voice demand and new data demand. Although, there are some substitution possibilities for some consumers (that is, a consumer may choose to send an e-mail or consult an on-line service rather than make a telephone call, or vice versa), it is evident from the growth of total demand that much of data demand is incremental. The growth in total demand and the significantly different features of voice demand and data demand place significant strains on LEC network capacity. Those strains on the network can only increase with further expansion of data demand. The telecommunications network is not engineered to handle usage with the characteristics of data demand because they are so different from traditional voice demand.

72. The combination of exploding growth of demand for Internet services combined with zero pricing has created a situation of increased demand for the local exchange that in some cases exceeds available capacity. There is no question that growth of demand for data transmission will continue, so that the congestion problem can only worsen. The consequences of that congestion are manifest. Call completions will become difficult during peak usage periods, thus degrading this important aspect of service quality. The increased load will affect the "safe operating point" for switches and trunks: "Severe difficulties have already been encountered in load balancing switches carrying significant levels of Internet traffic."<sup>49</sup> Congestion thus exists not only at the end user's loop, but also at the LEC's central office switches and trunks. LECs must then decide whether to tolerate a higher probability of blocked calls or upgrade their system.

73. Congestion is inefficient in a number of ways. The uniform (zero) pricing of incremental use of the Internet prevents high-valued uses from dominating low-valued uses, contrary to basic economic principles. Similarly, the uniform zero pricing of access to the Internet over the PSTN does

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49. Atai & Gordon, *supra* note 7, at 3.

not distinguish between voice usage and data usage of the PSTN, so that scarce capacity is not allocated to the highest-valued use. As noted previously, rationing by waiting makes capacity allocation depend on the user's opportunity cost of time rather than the value of the transmission service. High-value users have an incentive to seek bypass opportunities that may result in duplicative or inefficient facilities.

74. Congestion has another effect on users of the PSTN. The possibility of congestion reduces the expected likelihood of call completion. That degradation in turn lowers the *option value* of access for all users of the PSTN, whether for voice transmission or data transmission. Degradation of the quality of service in terms of higher blocking probabilities thus lowers the net benefits of all users of the PSTN, even if they do not actually experience a delay.

75. Congestion is an example of an "external diseconomy" or externality. The situation is analogous to air pollution or degradation of natural resources. When a resource is owned in common, it is owned by no one. Thus, when access is not rationed, usage cannot be excluded. Moreover, users of the resource do not have an incentive to conserve the resource because its value has been reduced by the absence of excludability. The data demand of ISP customers constitutes an externality because it imposes a cost on other users of the PSTN, whether they are other data users or voice users. When capacity is scarce (that is, when total usage exceeds available capacity), users compete to be the first to have access to the transmission capacity. They have incentives to increase their use of capacity—for example, by tying up telephone lines to maintain a connection because they are concerned about renewing that connection if congestion has lowered the call completion rate.

76. The solution to congestion of the PSTN, as with most other types of congestion externalities, is to ration access to the resource through pricing. Efficient prices match demand to available capacity and therefore allocate the resource to the highest-valued use. Pricing also creates incentives for rational usage. In contrast, the current situation of zero marginal pricing will cause eventual degradation of the quality of the PSTN.

**B. Pricing Regulations and the ESP Exemption Exacerbate the Congestion Problem**

77. Some ISPs argue that congestion is not a serious problem because it occurs only during limited time periods or in specific locations. For example, in comments submitted on behalf of the Internet Access Coalition, Lee L. Selwyn and Joseph W. Laszlo opine:

Far from having their entire networks threatened by data traffic overload, congestion and blocking is likely to occur at only a few distinct points in the network, primarily end offices that serve large ESPs, and possibly the particular interoffice trunks that serve those end offices.<sup>50</sup>

That assertion misses the basic problem. Because the LEC must meet quality of service requirements, it must create sufficient capacity to meet its service obligations. Thus, even if congestion problems are limited in time, capacity must be added to meet peak demand. To some extent the congestion problem can be exacerbated by peaks because excess capacity is then idle off peak.

78. Regulation requires LECs to be the carrier of last resort and to meet overall quality of service levels. Unlike competitive local exchange carriers (CLECs), the LECs cannot choose what customers to serve or when to serve them. Moreover, unlike ISPs such as America Online, the LECs cannot simply ration customers by declining to install sufficient capacity to meet demand. Rather, the LECs must hold sufficient capacity to meet traffic requirements *at all times and at all locations*. As the Commission noted in the portion of its *Notice* concerning access charge reform, "When incumbent LECs select the types of switches that they will deploy in their networks, they base their decisions on the anticipated peak demand."<sup>51</sup> Selwyn's and Laszlo's criticism of studies by Bell operating companies (BOCs), however, completely ignores the regulatory obligations on incumbent LECs to meet their peak demands for capacity:

In their studies, the BOCs significantly overstate the costs they incur as a result of data traffic. Data traffic has caused only a small number of problems that have required the

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50. LEE L. SELWYN & JOSEPH W. LASZLO, THE EFFECT OF INTERNET USE ON THE NATION'S TELEPHONE NETWORK 51 (Economics and Technology Inc., Jan. 27, 1997), *attached to* Comments of Internet Access Coalition.

51. *Notice* ¶ 77 (citing ENGINEERING AND OPERATION IN THE BELL SYSTEM (2d ed. 1983)).

BOCs to add or upgrade central office equipment.<sup>52</sup>

Although congestion can occur initially only at limited times and at a few locations, the capacity costs of alleviating that congestion can be substantial. Moreover, the BOC studies, as we previously noted, indicate that congestion problems are significant, pervasive, and increasing.

79. Because of the way that local access is priced, avoiding congestion would require the incumbent LEC to expand capacity of the PSTN to accommodate peak traffic. Holding capacity to meet peak demands means that there is excess capacity the rest of the time. There are three aspects of pricing that are related to peak-load problems:

1. There are no charges for local exchange usage. It is well known that usage-sensitive pricing would moderate demand at any point in time. Such moderation of demand would reduce usage at the peak period and reduce total capacity requirements.

2. Peak-load pricing of access, particularly for data transmission, would serve to redistribute demand over time, which also would reduce peak loads and lower capacity requirements.

3. It has been observed that usage is not distributed uniformly across the LECs service area. For example, Pacific Bell experiences congestion due to heavy data demand from Silicon Valley. Yet, prices are uniform throughout the service territory. Therefore, to avoid congestion requires tailoring capacity to deal with localized congestion.

In the absence of such pricing measures, congestion during limited time periods translates into significant capacity requirements.

80. Having suggested that congestion problems on the PSTN are overstated, Selwyn and Laszlo advance the contradictory argument that the PSTN provides *inadequate* capacity for data traffic. They suggest that because the LEC networks are circuit-switched and optimized for voice conversations,

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52. SELWYN & LASZLO, *supra* note 50, at 51.

despite advances in modem rates, "with the proliferation of graphics, animation, video and other high-bandwidth applications, even these higher data rates will prove inadequate."<sup>53</sup>

81. Accurate price signals are necessary not only for consumers to make efficient decisions, but also to provide investment incentives for suppliers of capacity. The combination of flat-rate pricing for local access and zero access charges for ISPs fails to provide efficient investment incentives for incumbent LECs and for CLECs. Incumbent LEC investment is discouraged because zero access prices certainly do not allow cost recovery. CLEC creation of bypass alternatives is discouraged as well because it is hard for any firm to compete with a free ride.

82. The study by U S WEST covering Colorado, South Dakota, Utah, and Washington that was cited previously showed that the incremental usage costs for ISPs were eight times that of a business line, without including incremental investments required to service the ISP such as dedicated lines and excess construction charges.<sup>54</sup> The 1996 study by Bell Atlantic found that the prices of its lines offered to ISPs were well below its cost of service because increased usage of the local exchange system due to Internet usage had required Bell Atlantic to add new equipment to central offices, to increase the number of trunk lines, to deploy more efficient Internet transport technologies (such as switched multimegabit data service), and to increase maintenance expenditures.<sup>55</sup> Although long-run solutions to the problems of network congestion posed by Internet usage will require the use of more advanced network architecture tailored to data transmission, ISPs use the FCC's ESP exemption to purchase primary rate ISDN lines, business dial tone lines, and other facilities to receive access to the local telephone network without charge to obtain a dedicated direct connection to the switch—all of which eliminate the incentives of ISPs to seek alternative access.<sup>56</sup>

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53. *Id.* at 53.

54. U S WEST STUDY, *supra* note 33, at attachment 10.

55. BELL ATLANTIC REPORT, *supra* note 36; *see also Superhighway Traffic Taxes Current LEC Networks*, TELEPHONY, July 29, 1996, at 35.

56. *Id.*

83. The ESP exemption interferes with market incentives for efficient matching of buyers and sellers. Because data are better handled on packet-switched networks, a free ride for ISPs on the PSTN reduces incentives for matching data users with the best access alternatives. ISP customers have greatly reduced incentives to seek out access alternatives. Some users who are concerned about congestion or about the speed of transmission on the PSTN will seek out other solutions (including ISDN service or bypass alternatives) and leave lower value users on the PSTN. Regulatory price controls such as the ESP exemption deprive the LEC of incentives to upgrade its networks to serve data users with specially tailored services; moreover, such controls create incumbent burdens that impede the LEC's competition with ISPs. What should instead emerge is a menu of access alternatives with different price-quality alternatives. The ESP exemption delays market innovation by offering ISPs an enticing free ride.

#### **C. Congestion on Data Networks**

84. While the Commission and the ISPs believe that the answer to congestion simply lies in installing more capacity and in reconfiguring the PSTN to accommodate data, it should be remembered that the Internet itself and ISP systems also are subject to congestion. The important implication is that congestion of LECs from data traffic is not due solely to the less efficient transmission of data on networks designed to handle voice traffic. Rather, data networks themselves are subject to congestion when priced improperly. Consequently, no amount of system redesign in the local exchange, without changing pricing policies, can solve the congestion problem. Rather, the problem is *the ESP exemption and regulatory price controls*.

85. It is important to note that congestion also exists outside of the LEC network itself. There are at least four points of congestion:

1. There is congestion at the modems that are the gateway to the ISPs. If too many customers call in at the same time, there will not be enough modems to serve them. For example, America Online has estimated that it can only accommodate 3.5 percent of its eight million



members at the same time.<sup>57</sup> This type of congestion is manifested as busy signals for those customers trying to call the ISP. In addition, the ISP's routers can become congested, which will cause delay for users.

2. The ISPs are connected to regional Internet access providers, which also have limited transmission capacity on their trunks and routers.

3. The regional Internet access providers are connected to the Internet backbone, which is itself subject to congestion. The Internet backbone is operated by companies such as MCI, Sprint, ANS, PSI, UUNET, and IBM Global Link.

4. Finally, at the interconnect level, there are private exchanges and National Access Points (NAPs), which are also subject to congestion.

86. Congestion on the Internet itself is manifested in the form of transmission delays and "dropped" packets. The growth of commercial development, applications such as real-time video and audio, and increased usage generally are taking place alongside capacity enhancements. The problem, however, is that usage on the Internet is not rationed by price; consequently, once a user has gained access, his usage appears to him to be free at the margin. Thus, a commons is created among users without any pricing mechanism for rationing usage. The economic consequences of such an arrangement are well known. There is little to prevent one person's usage from crowding out that of another. Vinton Cerf has vividly described this problem of the commons that exists on the Internet: "The hill is overgrazed, there's no more grass, and the sheep die."<sup>58</sup> Similarly, the *Economist* reports that "[d]elay, break-downs and glacial transmissions are part of everyday Internet life," and it adds that "intersections between networks are usually where the traffic backs up."<sup>59</sup>

87. The lesson to be learned from the experience to date is that data networks themselves are

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57. Hilzenrath, *supra* note 39, at D1.

58. Gurley & Martin, *supra* note 27.

59. *The Economics of the Internet, Too Cheap to Meter?*, THE ECONOMIST, Oct. 19, 1996, at 23.

subject to congestion as a consequence of the manner in which usage is priced. Thus, it is not simply the case that a circuit-based system becomes congested because it is not designed for data usage. Even a network engineered for data transmission is subject to congestion. Increasing capacity is not the solution to congestion. The problem stems from distorted pricing. If capacity is underpriced, users will continually find new ways of consuming capacity—such as video transmission—and suppliers of that capacity will not have an incentive to keep pace with the expansion in usage. Moreover, when the resource is underpriced, quantity-rationing mechanisms inevitably take over. The cost of rationing by waiting is inefficient allocation of scarce capacity and underinvestment in capacity expansion.

**D. The ESP Exemption Contributes to Shifting Internet Congestion onto the PSTN**

88. The ESP exemption creates congestion on the PSTN in another important way. A common phenomenon during rush hour is the congestion of streets near freeways as on-ramps become jammed. In some cases, freeway congestion is alleviated by stoplights at the on-ramps, which serve to create traffic jams on streets approaching those on-ramps as traffic backs up. A similar phenomenon occurs due to the ESP exemption: Traffic that is jammed up at the gateways to the ISPs is shifted onto the PSTN.

89. Congestion on the ISP's system occurs when demand for connection outstrips the ISP's lines and modems. Callers encountering busy modems at the ISP then can worsen local exchange congestion as the queue is shifted onto the local exchange.

90. The pricing of Internet service contributes to congestion in the local exchange in a number of ways. When ISP lines become jammed and callers encounter busy signals, they will repeatedly call to try to get a free line. This repeated dialing places additional strains on the local exchange. Effectively, the queue for access to ISPs is moved onto the PSTN; thus the costs of handling the queue are shifted to the LEC. A World Bank study of telecommunications in less developed countries has observed this phenomenon and has noted that congestion results not only from telephone exchanges and trunks not

being able to handle call traffic, but

also . . . from the high proportion of time that the telephone called is engaged; thus subscribers repeatedly attempt to place calls, which, when added to the repeat calls resulting from equipment congestion, further strains the network's capacity.<sup>60</sup>

The busy signals experienced by eight million America Online users did not impose costs only on users. They also shifted costs onto the local exchange as users dialed repeatedly to obtain a connection. Thus, the congestion externality is not simply data traffic crowding out voice traffic on the local exchange network. It is also congestion on the ISP's system being shifted back onto the local exchange.

91. This queuing problem means that the cost of congestion at the ISP is not simply the waiting time of the ISP's customers. Rather, some the congestion is exported back to the PSTN through call attempts. The ISPs do not pay for any of the incremental costs they impose on the PSTN because access charges are zero. Moreover, the current structure of rates charged to the ISPs for access lines gives them an incentive to move their queue onto the PSTN rather than handling it through adjustment of their usage pricing and through investment in increased capacity. Thus, ISPs free ride in another way on the PSTN: They use the PSTN as a rationing device for their own systems. Without this convenient way to "park" their customers, the ISPs would have an incentive to invest in greater capacity.

### III. PRICING INTERNET ACCESS TO ISPS

92. Continuing the ESP exemption is a form of access price regulation that sets the access price at zero for ISPs. The consequences of such price regulation is evident: (1) adverse selection among voice users and data users of the telephone system; (2) congestion externalities that appear on the local exchange at certain locations at certain times, but that threaten to degrade service quality; (3) inefficient consumption decisions; (4) inefficient investment decisions by ILECs, CLECs, and ISPs; and (5) inefficient incentives for innovation.

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60. ROBERT J. SAUNDERS, JEREMY J. WARFORD & BJÖRN WELLENIUS, *TELECOMMUNICATIONS AND ECONOMIC DEVELOPMENT* 65 (World Bank & Johns Hopkins University Press 2d ed. 1994).

93. Those problems raise a number of questions. How should access to ISPs be priced? How should access pricing be regulated? What is the best access technology? How should regulators approach the question of access technology? Those four questions are intimately connected. Regulation of access pricing will have a substantial impact on access technology and thus will create unintended consequences. The consequences that may be unintended are similar to those observed for the ESP exemption. A pricing policy that was intended to stimulate development of Internet access may actually retard the process while reducing the quality of the PSTN. Similarly, having regulators "pick winners" in access technology will have a substantial impact on pricing, again with the possibility of unintended consequences. Innovation may be slowed down by a command-and-control approach with the end result being higher costs for consumers and fewer access options.

94. The main point is that pricing and access technology options are closely connected and determined together. Technology presents a menu of options for data transmission: the status quo PSTN, narrowband ISDN integrated within the existing system, ADSL and high-bit-rate digital subscriber lines (HDSL) on copper loops, bypass alternatives using coaxial cable or wireless transmission, or broadband networks with fiber-to-the-curb. It is too soon to choose the best technology for data transmission; and in any case, choosing is beside the point. The choice is not an administrative regulatory decision. It is not the FCC's choice to make. Although it is certainly entertaining to imagine the possibilities created by technological innovation and to speculate on emerging technologies and their capabilities, the information involved in sorting out the various options far exceeds the capabilities of any single customer, telecommunications company, or even a federal regulatory agency.

95. The choice of technologies is best left to market competition. In fact, the different transmission access options have different cost and performance characteristics, so that it is most likely to be the case that multiple access solutions are desirable. Many or all of the available solutions involve *cost-performance tradeoffs*. The outcome to be avoided is for the Commission to select a one-size-fits-all

approach, which would do nothing less than stifle innovation and impede investment.

96. Correspondingly, the choice of access pricing is best left to market competition. Because the different access options for data involve cost-performance tradeoffs, restrictive price controls would bias the technological outcome, as the ESP exemption already has done. The goals of product variety, consumer choice, and producer innovation call for relaxing price controls on access. That means that access options offering greater bandwidth and reliability at a higher cost should be available to those customers that require higher quality data connections for Internet access, work at home, or other uses.

#### A. Pricing Access

97. Access is not priced in a vacuum, because it reflects not only the cost of connecting to the network, but also the capacity costs that usage of the network entails. That point bears emphasis when considering demand for data transmission. One question is whether access to ISPs is provided over the PSTN or bypasses some or all of the local network.

98. Access to the local exchange network, as defined by John T. Wenders, refers to “the *right* to be connected to the network and make calls at whatever price is charged for usage,” where usage denotes outgoing calls only.<sup>61</sup> He further observes that access can include the right to receive calls. In addition to the connection to the network at the time of use, the right of access also includes the *option* to receive calls or to purchase calls at existing prices.<sup>62</sup> Thus, access to the local exchange network includes both a connection and option component. There are costs associated with providing both connections and standby capacity to supply the option to achieve a connection. The costs of standby capacity are capital costs of network capacity that are similar to the merchant’s cost of holding inventory to provide “immediacy” to customers. Clearly, the pricing of access to the local exchange network depends on the price of usage. Flat-rate pricing effectively sets the price of usage at zero and requires

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61. JOHN T. WENDERS, THE ECONOMICS OF TELECOMMUNICATIONS: THEORY AND POLICY 46-47 (Ballinger Publishing Co. 1987) (emphasis in original).

62. *Id.* at 48.

cost to be covered from the price of flat-rate service and the price of access.

99. The services of the local exchange network are an input to various network services. Access to the local exchange network, which includes both connection and option components, is used to obtain services such as interconnection with other networks. Connection to an ISP for a customer of the local exchange requires access to the local exchange network. It also includes *usage* of the local exchange network, including local loops, switching, transport, and other network services required to reach the ISP's point of presence. In other words, originating the connection to an ISP's point of presence using the local exchange network includes three components: (1) connection to the LEC's network itself; (2) the option value of that connection; and (3) usage of the LEC network to reach the ISP's point of presence. Pricing the connection to the ISP should reflect the costs of those three components. The customer of the LEC originating a data call already pays for access (that is, the right to connect and the option value of the connection). The customer of the LEC should also pay for the usage of the network in connecting to the ISP's point of presence.

100. Calls on the PSTN to ISP points of presence clearly entail usage costs and make claims on scarce capacity. The pricing calls to the ISP points of presence should reflect those costs, whether the additional charges are placed on callers or on the ISP itself.

101. Moreover, because data calls require different equipment and represent different patterns of usage, connection to ISP points of presence should be different from usage of the network for local calls. Because ISPs receive calls that originate on the local network and generally do not use terminating access, the costs imposed by data traffic should be recovered from the originating access on the local exchange network. Because a local loop can be used for both voice and data calls, the costs imposed by data calls should be recovered through usage charges on the consumer and access charges on the ISP for originating access.

102. That discussion implies that pricing of access to ISPs should include separate components

that reflect the costs of connection and usage. Those costs can be divided in some manner between end-users and ISPs. Regulation should be sufficiently flexible that customers can choose different forms of access involving different transmission technologies and be charged accordingly. Moreover, customers should be able to choose different service quality levels and be charged accordingly. All customers using the PSTN should bear the capacity costs that their usage causes.

103. Just as interexchange carriers pay access charges, so should ISPs, particularly given the high network usage costs associated with data transmission. Because data transmission over the PSTN consumes scarce transmission and switching capacity, those costs should be reflected in ISP access charges. Moreover, the access charges should reflect the costs imposed on the local exchange network by the configuration of the ISP in terms of the number of access lines per customer, the pattern of usage of ISP customers, and the queuing and repeated calls that occurs over the PSTN.

**B. LECs Should Have Flexibility in Setting Market-based Access Charges**

104. Regulators face a difficult problem in attempting to select efficient prices. Rather than trying to mimic market processes through command-and-control regulation, regulators should rely as much as possible on market forces to set prices. Prices for originating and terminating access should be capped by existing market alternatives. Access prices include both nontraffic-sensitive and traffic-sensitive portions reflecting the costs of transmission between the point of presence and the origination or termination point on the local exchange network. The usage-based component should depend upon such cost-causing factors such as time and distance. To ensure that prices reflect cost causation, it is necessary to eliminate flat rates and other cross-subsidies in the rate structure. Access prices should cover the incremental cost of providing access to the ISPs (TSLRIC) plus a *market-allowed* contribution to common costs. That contribution should reflect the opportunity costs to the LEC of capacity that is used for data traffic. LECs should be given flexibility in setting access prices.

105. For many of the LEC's customers there are competitive benchmarks for pricing access

that serve to lessen or eliminate any monopoly power on the part of incumbent LECs. With competing access alternatives, customers can choose the least-cost alternative. Thus, if the price charged to customers for access to ISPs by the LEC is too high, the customer has several alternatives. First, the customer can obtain wireless access from a cellular carrier or digital PCS provider. Such access serves to place an upper limit on what can be charged for originating access. That limit obviously can be expected to fall as multiple PCS providers commence service in a given geographic market. Second, for those customers who generate most of the net revenues of the LEC, the price for originating access is bounded by the market prices of competing carriers offering access, including competitive access providers (CAPs) operating fiber optic networks in a large number of city centers. Third, cable television operators can provide ISP access through cable modems. Fourth, with the passage of the Telecommunications Act of 1996, entrants can provide local access services through resale of the incumbent LEC's local service or through the operation of certain facilities combined with purchasing the services of the incumbent LEC's unbundled network elements.<sup>63</sup> Regulation of the prices of resale and unbundled network elements continues in force. Interexchange carriers and other entrants can construct virtual networks for the provision of access. The pricing of access thus cannot exceed the cost of self-provisioning of access.

106. As we have stated in our earlier affidavit and reply affidavit on access charge reform, in light of the accelerating facilities-based market competition in the local exchange, the presence of unbundled network element alternatives provided to entrants under the Telecommunications Act, and the economic incentives of LECs to supply access competitively, the Commission should rely on market forces to adjust the connection and usage portions of the access charges from their current levels.

107. The Commission should dismiss concerns that removing the ESP exemption will create excessive prices for access to ISPs. The competitive alternatives just cited and the incentives of the LECs

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63. As we note below in paragraph 139, however, access competition in the form of resale or UNEs may still create serious congestion of the incumbent LEC's network.



to provide access are sufficient for light-handed price controls to achieve the desirable objectives, with the removal of price-caps as interconnection agreements are approved.

108. The Commission also should dismiss concerns that removing the ESP exemption will slow the development of the “information superhighway.” The burgeoning information transmission will continue apace, driven by advances in computers and communications technology, and the accompanying developments in software, communications protocols, and commercial, educational, medical, entertainment, and other applications. The issue at hand is the development of effective access—the *on-ramps* to the information superhighway. Underpricing access through the ESP exemption or other restrictive price controls will harm customer choice, and hold back the incentives for ILECs, CLECs, and others to upgrade or supplant existing access options.

**C. The ESP Exemption Is a Zero Price for Data Transmission**

109. Without question, the ESP exemption is a zero price for data transmission. The LECs are being forced to subsidize the ISP by carrying costly data traffic for free. Presumably, they are supposed to “make it up on volume.” Although such a situation may be humorous to some, it entails very serious economic inefficiencies and large scale subsidies.

110. Chairman Hundt has indicated his intention to maintain the ESP exemption on the grounds that there is insufficient information available: “I just don’t think the FCC knows enough at this time to alter the current ESP exemption.”<sup>64</sup> How much more information is needed to understand the consequences of pricing at zero? The effects of rent control on the quality and availability of housing, and on allocation by queuing are well known. The effects of access to common property resources at a zero price also are well understood. There is no need to study technological change in the communications industry to understand such a basic lesson of economics: Pricing of scarce resources at zero is inefficient. Chairman Hundt continues in the same speech:

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64. Reed E. Hundt, *Convergence or Collision: Telecommunications Regulation and the Internet* (text version of speech delivered in Berkeley, Cal., Mar. 7, 1997) <<http://www.fcc.gov/Speeches/Hundt/spreh712.html>>.

But I do think we know one important thing: our best bet for promoting Internet solutions will be our overall competition policy.

The Telecommunications Act of 1996 should really be called the Big Bandwidth Act, because that's what it will mean if we do our job right.

To have big bandwidth networks, we will need to see the kind of competition that characterizes, for example, the pizza delivery business. Like pizza, bandwidth will be delivered piping hot to your door, in small, medium, or large size. You'll be able to get . . . anything you want on it—voice, video, or data, in any combination.<sup>65</sup>

Although the analogy is tantalizing, there is no free lunch, even in the pizza business. Imagine Domino's Pizza being told that computer users can have pizza delivered free to their door as a means of promoting development of the information industry. Everyone would have an incentive to purchase a computer just to receive the free pizza. The free pizza, by federal mandate, would certainly make it more difficult for others to compete. And where would the subsidy for the free pizza come from? No firm could stay in business for long delivering services for free, be it pizza or bandwidth.

111. In another recent speech, Chairman Hundt draws an analogy between transmission of data and utility services:

At the forum, Les Vadasz from Intel described how he would solve the bandwidth problem. As he pointed out, you can turn on your tap and get water, you can put a plug in a socket and get electricity, you turn on your TV and get cable. Why can't you just connect your PC to an outlet and get data?

He laid out seven requirements for this data service. Number one, of course, is bandwidth. Number two, is instant access—no dialing in. Number three, plug and play service, just like cable. Number four, multimedia capability—voice, video, data. Number five, store-and-forward capability, so that voice mail and E-mail are easy and reliable. Number six, security. And, number seven, affordability.<sup>66</sup>

Chairman Hundt evidently believes that Internet access should flow to the consumer like water. But if water flowed freely from the tap, there would be no incentive to conserve in its use. If electricity were priced on an unmetered basis, air conditioners would be set at 68 degrees and run continuously in August in Washington, D.C. And if smoke could be freely released from factories, there would be no incentive to conserve on clean air by reducing emissions. The fact that people have become accustomed to free data

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65. *Id.*

66. Reed E. Hundt, *Bandwidth and Pizza* (text version of speech delivered to the ACM97 Conference, San Jose, Cal., Mar. 4, 1997) <<http://www.fcc.gov/Speeches/Hundt/spreh711.html>>.

transmission on the PSTN does not make efficient pricing of Internet access any easier politically. Markets, however, have little tolerance for ill-considered public policy that attempts to provide “free” water, electricity, pollution, or even data transmission.

112. Moreover, the affordability of Internet access should be achieved by competition, not by regulatory price controls. Chairman Hundt, however, concludes:

I don't think the right approach to achieve those goals is for local phone companies to impose access charges on Internet service providers. The Internet shouldn't contribute to the subsidies that access charges represent. But the Internet also shouldn't be subsidized in the form of below-cost second lines. If someone wants to buy a second line to access the Internet, the phone company should be entitled to charge them what that line costs.<sup>67</sup>

To suggest that charging ISPs for access contributes to a subsidy for the local exchange turns on its head the fact that a zero price of access is a subsidy to ISPs and their customers. Although access charges may have reflected regulatory cost allocations in the past, the solution is not to eliminate those charges completely. Rather it is necessary to allow prices to reflect resource scarcity. A zero price cannot accomplish that objective.

113. The suggestion that the price of second lines should be decontrolled sounds appealing if it indicates a general willingness to remove regulatory price controls on access. The pricing of lines, however, is a matter that is subject to state jurisdiction. Moreover, it is difficult to identify which of the two lines serving a household is the “second” line. Should access charges be applied to only one line? Such a distinction is impractical. Far better to decontrol access charges altogether. Zero access charges for connection to ISPs is unquestionably below-cost pricing.

#### **D. TSLRIC or TELRIC Pricing of Access for ISPs Is Inefficient**

114. Although substantially superior to the zero pricing giveaway of the ESP exemption, TSLRIC and TELRIC pricing of access for ISP suffers from the same problems of such pricing policies in general.

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67. *Id.*

**1. TELRIC Pricing Does Not Reflect the Incumbent LEC's Total Direct Costs**

115. The Commission should resist any calls to price access for ISPs at their TSLRICs or on the basis of the TELRICs of access elements. If all of the firm's services were to be sold at their TELRICs, then the firm would not cover its total costs. The difference between a firm's total costs and the sum of that firm's incremental costs is equal to the firm's shared costs and common costs. Thus, under TELRIC pricing the firm would incur losses exactly equal to that remainder—that is, the firm's shared costs and common costs.

116. The firm's shared costs and common costs are precisely its economies of scope, which means that they are the firm's efficiency gains from jointly producing multiple services. To price without regard to those costs is to penalize a firm for its efficiencies.

117. Because TELRIC pricing fails to recover any of the incumbent LEC's shared costs or common costs, it interferes with the incumbent LEC's opportunity to earn a fair rate of return on its investment or even to recover its investment. That outcome violates section 252(d)(3), added to the Telecommunications Act in 1996, which calls for the firm to recover its costs, with pricing that may include a reasonable profit.<sup>68</sup> TELRIC pricing *guarantees* losses and thus is inherently confiscatory. A policy that required TELRIC pricing would therefore violate section 252(d)(3) and constitute a taking. A firm that does not cover its common costs and shared costs will not remain in business for very long.

**2. TELRIC Pricing of Access Would Subsidizes the ISPs**

118. TELRIC pricing involves cross-subsidies. The incremental cost test for cross-subsidization requires that each service, *and each combination of services*, must cover its incremental cost.<sup>69</sup> That outcome easily fails to occur with TELRIC pricing as soon as the firm produces more than two services and any group of services has shared costs. In a general sense, TELRIC pricing creates cross-subsidies

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68. 47 U.S.C. § 252(d)(3).

69. *See, e.g.,* WILLIAM J. BAUMOL & J. GREGORY SIDAK, TOWARD COMPETITION IN LOCAL TELEPHONY 69–72 (MIT Press & AEI Press 1994).

when multiple services are available that have shared costs or common costs. Those costs do not magically disappear. Failure to cover those costs makes those services available collectively at less than their total costs.

119. As a result of the ESP exemption, the ISPs have already made inefficient investment and pricing decisions. Although eliminating the exemption and allowing prices to at least reflect the incremental costs of access would improve matters, there would still be subsidies involved. Such subsidizing of services by pricing them at TELRIC sends the wrong price signals and leads to incorrect decisions. When prices are too low, excessive use of underpriced facilities will result and distort the decisions of resellers. The entry and expansion of resellers is thus not only encouraged, but also financed by underpriced facilities.

120. Moreover, when network services are priced too low, the building of competing facilities is likely to be discouraged. Thus, rather than stimulating facilities-based competition, TELRIC pricing discourages it. Why should an entrant seek a competitively priced alternative when it can free-ride on the incumbent LEC's facilities at prices that are below cost? TELRIC pricing turns out to be a misnomer: It should more appropriately be termed "individual-service LRIC," for it ignores the incremental costs of *combinations* of services.

### **3. TELRIC Pricing Creates Incentives for Excessive Unbundling**

121. TELRIC pricing creates incentives for excessive unbundling because it ignores that unbundling shifts costs from attributable costs to shared costs and common costs. A firm cannot apply any pricing methodology independently of the characteristics of the products and services for which prices are being chosen. On the demand side, the characteristics of the products and services will affect the willingness of consumers to pay for those products and services. On the supply side, if the firm sets prices subject to regulatory controls based on its costs of service, then the definitions of the products and services will significantly affect the costs that are attributable to those products and services.

122. The pricing methodology that regulators adopt for ISP access, as well as for resale and unbundled network elements, should be flexible enough to adapt to the regulations governing the extent of unbundling. Efficient and compensatory pricing must allow the firm to recover its economic costs, including both its attributable costs and its unattributable costs—namely, its shared costs and common costs. TELRIC pricing creates a perverse incentive. Unbundling requests from competitors using LEC services may be strategic actions, rather than legitimate requests for access to network services. Competitors not only avoid paying a portion of shared costs and common costs, but also have an incentive to request ever finer partitions of services, and interconnection at every technologically feasible point, so as to shift costs farther away from incremental costs and into shared and common costs. That strategic opportunity allows competitors to free-ride on the incumbent LEC.

123. Thus, it is not surprising that, in a report for the Internet Access Coalition, Selwyn and Laszlo argue with regards to the development of packet-switched data networks: “Competing local carriers could speed that deployment *if they were provided access to individual outside plant loop components currently under the exclusive control of the incumbent LECs.*”<sup>70</sup> Market-based pricing avoids those perverse incentives because competitors must pay for the costs of the services that they purchase—both the incremental costs and a portion of the shared costs and common costs. By allocating shared costs and common costs in a competitively neutral manner, market-based pricing eliminates the incentive for competitors to make strategic requests for excessive unbundling. Instead, a competitor will purchase resale, unbundled network elements, interconnection, and interstate access on the basis of its market prospects rather than as an attempt to manipulate the regulatory system.

#### **4. TELRIC Pricing Fails to Include Increases in Shared Costs and Common Cost That Result From Unbundling**

124. Unbundling has costs. The provision of resale services and unbundled network components entails two types of costs: transactions costs and production costs. Unbundling should not

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70. SELWYN & LASZLO, *supra* note 50, at 53.

be an end in itself, for the bundling of products and services reduces customer transaction costs and enhances convenience. Access to a few types of local network elements is sufficient to achieve the objectives of deregulation. Competitive markets are capable of resolving the tradeoff between the need to customize offerings and the advantages of bundling. The costs of mandated unbundling must be reflected in estimates of the incumbent LEC's incremental costs, shared costs, and common costs and thus included in the prices for resale and unbundled network elements. TELRIC pricing will capture wholesaling costs if and only if all of those costs are attributable. But it will not capture those transaction costs and production costs due to wholesaling that increase shared costs or common costs. Thus, TELRIC pricing will fail to reflect the full economic costs of unbundling.

125. The inefficiencies associated with the transaction costs and production costs of specialized services under mandatory unbundling are a problem when costs are shifted to the incumbent LEC's other customers or when the LEC is expected to shoulder those costs as a means of easing the transition to competition. Unbundling becomes an incumbent burden that potentially hinders the incumbent LEC's ability to compete and subsidizes new entrants, thereby distorting their decisions about how much to invest in competing facilities. Just as overpriced network services can induce inefficient bypass decisions, so also can subsidized wholesale services induce underinvestment in facilities and overuse of network components relative to less costly alternatives. Thus, the use of TELRIC pricing for ISP access services will be inefficient to the extent that it fails to capture the full costs of concurrent unbundling.

**5. TELRIC Pricing Creates Incentives for the Incumbent LEC to Reduce Its Common Costs or Shared Costs**

126. Because TELRIC pricing fails to compensate the incumbent LEC for its shared costs and common costs, adoption of such pricing would create an incentive for the LEC to reconfigure its network and change the structure of the company so as to increase the proportion of costs that would be attributable to those services priced at TELRIC, and to lower costs that would be classified as shared costs or common costs. That shift in the incumbent LEC's cost structure would not represent efficiency

gains: By lowering shared costs or common costs, the company would potentially increase *total* costs because it would lose some of the benefits of economies of scope. Moreover, the reductions in uncompensated shared costs or common costs that are necessary to enable the firm to break even could result in a lowering of the quality of service or the elimination of some services that are uncompensated. Thus, TELRIC pricing creates a situation that is ripe for the law of unintended consequences. TELRIC pricing of access services for ISPs is problematic because of its effects on the incentives for LECs to participate in the creation of enhanced transmission for handling data and the ultimate development of broadband networks.

**6. TELRIC Pricing of Access With an Administratively Determined Share of Common Costs Is Also Inefficient**

127. TSLRIC pricing and TELRIC pricing with administrative determined shares of common costs, although recognizing the fact that telecommunications networks have common costs, still fails to address the problem of efficient access pricing. TSLRIC pricing plus arbitrary shares of common costs is not efficient because it does not reflect the LEC's economic costs, which include the direct incremental cost *plus* the opportunity costs of the facilities to which the incumbent LEC provides access. The TSLRIC pricing method is neither efficient nor compensatory because the incumbent LEC will not be allowed the opportunity to recover its economic costs. That point applies with particular force to the pricing of data transmission because the significant capacity utilization creates network congestion. Such congestion must be reflected in the pricing of data transmission and access services, to provide proper incentives for consumers and suppliers of those services.

128. Competitive pricing does not emulate TSLRIC or TELRIC pricing or fully distributed cost pricing approaches. To the contrary, such pricing would invite free riding and would subsidize entrants, both conditions that competitive markets do not willingly tolerate. The imposition of TSLRIC or TELRIC pricing would create the perverse incentive for the incumbent LEC to reduce its common costs and shared costs. That action would be the direct response to the tendency of such pricing to shift attributable costs



to shared costs and common costs, and to increase the incumbent LEC's shared costs and common costs as a result of unbundling. In addition to those failings, TSLRIC or TELRIC pricing does not permit the incumbent LEC to have dynamic pricing flexibility. Such pricing discriminates in favor of entrants and against the incumbent LEC. In short, the call to apply TSLRIC or TELRIC pricing to interstate access (as well as to resale and unbundled network elements) misapprehends the most basic principles of price theory.

129. The Commission advocates TSLRIC (or TELRIC) pricing plus a reasonable share of common cost for IXC access. That proposal should be applied to the ISPs as well, as long as the "reasonable share of common cost" is determined by market forces rather than by administrative fiat.

#### **E. The Pricing of Data Transmission**

130. The pricing of data transmission on the LEC network should be deregulated in light of competitive access alternatives. We recommend elimination of the ESP exemption with decontrol of access pricing for ISPs to the greatest extent possible, allowing the market for access to determine the price of access services.

131. The many alternative technologies for access to ISPs and the many alternative designs of prospective data networks suggest the need for market-determined pricing. Moreover, the pricing of transmission on data networks such as the intranet is far from settled. There are substantial transactions costs in metering the transmission of data packets. Some economists recommend that there be priority pricing of packet delivery based on a system of real-time auctions with bids chosen by the local administrator who controls access to the net, by the user of the computer, and by the computer software itself.<sup>71</sup> Generally, Internet transmission remains a best-efforts delivery system without priority pricing methods. Those users seeking increased reliability or speed transmit on private commercial systems.

132. The pricing of data networks is a difficult and largely open question, which suggests

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71. Jeffrey K. MacKie-Mason & Hal R. Varian, *Some Economics of the Internet* (University of Michigan, rev. version Feb. 17, 1994).